The University of Chicago

THE RELATION OF INFERENCE TO FACT IN MILL'S LOGIC

A DISSERTATION

SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL OF ARTS
AND LITERATURE IN CANDIDACY FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

(DEPARTMENT OF PHILOSOPHY)

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CHAPTER I

SUBJECTIVE FACTS AS DATA

The problems of logic are coming to form the center of interest in philosophical discussion. Most present controversies in the field of philosophy turn upon some difference which is fundamentally logical. There is need, therefore, to re-examine and clarify the underlying conceptions of logic. Any one of the great historical systems of logic offers a species of laboratory example of the shaping of logical concepts under some specific point of view, and the difficulties which it leaves unresolved offer valuable experimental material for further logical construction. It is with such a purpose that this paper undertakes an analysis of the relation of inference to fact in Mill's logical system.

In constructing a theory of inference Mill's problem was to reconcile the associationism of the English empirical school with the procedure of modern physical science. He occupies alternately the subjective point of view of the one position and the objective point of view of the other. This oscillation of position comes out strikingly in the varied status which he gives to facts, which are at one time the ultimate constituents of consciousness and at another time the things and events of an independent world. When stating the relation of inference to its data and thus assigning it a locus, he takes the subjective point of view. When analyzing the nature of inference and basing its validity, he takes the objective point of view. It will be well, then, at the outset, to examine his conception of both subjective and objective facts, and the transition which he seeks to effect from the one to the other. Over against both of these, facts in the mind and facts in nature, Mill naïvely utilizes a system of meanings which he never thinks of as sundered from the facts, yet which are assumed as logically independent in his inferential process. An examination of the system of meanings we shall postpone till after we have examined his assumption of facts, and will consider the latter apart from their meaning so far as that can be done without distortion.

The locus of inference in relation to fact, as assigned by Mill, rests on the distinction between immediate and mediate knowledge. The first is self-evident, the second reasoned. We obtain the first by intuition, the second by inference. "Truths are known to us in two ways: some are known directly, and of themselves; some through the medium

of other truths. The former are the subject of Intuition; . . . . the latter, of Inference."[1] They are "truths known to us by immediate consciousness" and "conclusions which can be drawn from these."[2] Of these two classes of truths, the first does not require proof; such a truth carries its own evidence—"that is, is without evidence in the proper sense of the word."[3] It must therefore be "known beyond possibility of question."[4] One cannot but be certain of it. But only a small part of our knowledge has intuitive character.[5] By far the larger portion hangs suspended from these immediate truths by a series of proofs.

This apportionment of knowledge appears on the face of it very clear and definite. At any rate it seems to offer a hopeful program: to begin with perfectly certain data and to let each step from those data be one of strict proof. Upon examination, however, the simplicity of the matter disappears. Like the gratuitous advice to "be sure you are right, then go ahead," this program does not tell us how to know when we *are* right. This conception of primitive and unquestionable data, indeed, is thoroughly ambiguous. While he does not uncover its source, Mill has to acknowledge this ambiguity in two respects:

First, Mill admits that there is difference of opinion as to the kind of data from which we start. He sets in sharp contrast two theories on this point: the "ontological" theory of the Scotch school, and the empirical theory of his own English predecessors, which he defends.[6] The former holds that, in addition to the data admitted by the latter school, the mind is so constituted as to know intuitively the existence and laws of operation of certain objects external to the mind, while the latter recognizes "no ultimate premises but the facts of our subjective consciousness; our sensations, emotions, intellectual states of mind, and volitions." Mill considers all thinkers to be agreed that there are *some* such primitive data, but to disagree as to whether or not such data are exclusively subjective. But surely the very possibility of dispute as to the character of what are to be considered primitive data is a very serious obstacle to the theory that there are any data at all to be taken as unambiguously primitive.

There is a second ambiguity of more serious character, not so explicitly recognized, though virtually acknowledged by Mill. While it

[1] Mill, *Logic*, 8th ed., Harper, 19*d*. References to the *Logic* are hereafter by page numbers, without repeating the title. To make references to the *Logic* more definite, letters are added to designate in order each paragraph or part of paragraph on a page.

[2] 19*e*–20*a*; Mill, *Examination of Hamilton*, 137.

[3] 21*b*. [4] 20*c*. [5] 21*c*. [6] 520*b*.

seems clear to him that consciousness immediately reveals the primitive data of our knowledge, which consist of our own subjective states, Mill finds it impossible in practice to determine what those data are. Assuming agreement as to their subjective character, their actual discovery in detail proves impossible. Supposed to be known "beyond the possibility of question," they are in fact unrecognizable, because they cannot be distinguished from the inferences that are drawn from them. "We may fancy that we see or feel what we in reality infer. A truth, or a supposed truth, which is really the result of a very rapid inference, may seem to be apprehended intuitively."[1] Observation, which is another name for intuition, is constantly vitiated by confusion with inference. "Observation and inference are intimately blended."[2] Now if we *ever* mistake inference for observation, it surely follows that we can *never* be sure we have not done so. There is no safe criterion by which to distinguish the two; for the apparent self-evidence of immediate intuition, our only resource in the case, is admitted to be liable to fail. It is idle to urge "a correct discrimination between that, in a result of observation, which has really been perceived, and that which is an inference from the perception,"[3] for the supposed purity of the observation may still be only our "fancy." "From my senses," Mill claims, "I have only the sensations, and those are genuine."[4] No doubt they would be genuine *if* I could be sure that they are truly mere sensations. "Errors of sense," he says again, "are erroneous inferences from sense; . . . . the deception . . . . is in my judgment."[5] But since such errors are always possible, how can I know that there are no further errors of judgment lurking in what I fancy to be perception?

Evidently this distinction between intuition and inference proves unworkable, and breaks down for lack of a criterion of discrimination between the two. If we press the difficulty farther to discover its precise nature, we find it involved in Mill's theory of consciousness, or of experience, as consisting of given mental states. An experience of that kind would properly leave no room for inference; and in grafting inference upon it Mill introduces an alien element in contradiction with his premises. This point will repay closer examination.

[1] 20*d*. Cf. Mill, *Berkeley*, 278.

[2] 450*b*. So Mill contrasts "experience" with "a mistaken supposition of experience" (195*d*), or with "a superficial semblance of experience" (196*a*).

[3] 451*c*. "We ought to know what part of the assertion rests on consciousness, and is therefore indisputable, what part on inference, and is therefore questionable" (545*c*).

[4] 451*a*. [5] 450*d*.

Mill professes himself an adherent of Berkeleyan idealism, which he received from his father in the form of an elaborated associational psychology. To this school of thinkers it seems axiomatic that only our own mental states are immediately known to us. It inevitably follows that consciousness is shut up to its own subjective contents, and that the knowledge of anything else, if the possibility of such knowledge be granted, must be capable of translation into terms of mental states.

The primary interest of this school, both historically and constructively, is directed upon the analysis of the knowledge of an external world into constituents of sensation. So strong is this interest in sensation, an interest which has rightly earned for the school the designation of sensationalist, that one would almost suppose consciousness to be composed solely of a kaleidescopic succession of sensations. Sensations, in their temporal and spatial discreteness, their qualitative resemblances, and their associational connections, are at any rate taken as the type of mental facts. And it is this sensationalism on which Mill rests when he lays down the distinction between intuition and inference.

Yet sensations are not the only contents of the mind acknowledged by Mill. With reference to the other contents of the mind there are two conflicting tendencies: either, on the one hand, to reduce them all to mere given mental states of the same immediacy as sensation, in which case there is no opening for inferences to slip between them; or, on the other hand, to lift them to the level of various operations performed upon and with sensation, in which case inference finds a work to do but immediacy is gone.

There are several of these other classes of mental states recognized by Mill, and one or two factors that he does not think of classing as mental states, but which, if not so classified, do not fit into his original theory of consciousness. Beside sensations, he classes as mental states images, emotions, volitions, and thoughts. Relations he hesitates about so classing. Meanings he does not class here, and on this side of his system they are simply an outstanding factor. Some of these non-sensational mental facts require examination.

What we now call mental images constitute the simplest of the non-sensational mental states recognized by Mill. Mill usually calls them "ideas," as against sensations, which he also calls "impressions," after Hume.[1] "Whenever any state of consciousness has once been excited in us, no matter by what cause, an inferior degree of the same state of consciousness, a state of consciousness resembling the former, but

[1] But of course he has other uses of the term "idea."

inferior in intensity, is capable of being reproduced in us without the presence of any such cause as excited it at first. . . . . This law is expressed by saying, in the language of Hume, that every mental *impression* has its *idea*."[1] "These ideas, or secondary mental states, are excited by our impressions, or by other ideas, according to certain laws which are called Laws of Association."[2] Here one might be tempted to see between primary and "secondary mental states" a distinction corresponding to that between intuition and inference, or immediate and mediate. But such a comparison would be entirely misleading. Impressions and ideas stand for Mill upon exactly the same level of immediacy. The distinction which he makes between them on the ground of the presence or absence of a stimulating object[3] is from this point of view illegitimate, for it is not based on a difference in their actual analyzable content, but is itself an inference we draw from their organized relations. Again, the laws of association by which these secondary states are aroused by no means coincide with the inferential laws by which we pass from facts directly known to facts known through proof. The confusion of inference and association which sometimes does arise Mill expressly brands as a serious logical fallacy.[4] Sensations and images, in short, are on the same level of immediacy, both directly given in consciousness. They are both mental fact. From this point of view we should have no right to treat memory and expectation as in any sense a means of rising inferentially above the immediate data of consciousness.

The other mental states which must be included in the immediate content of consciousness Mill classifies as thoughts, emotions, and volitions. These are taken exactly in the same way as sensation, all equally immediate. Emotions and volitions[5] we may for our present purpose lay aside. But the mental states which he calls thoughts have grave significance for a theory of inference.

It is certainly disconcerting to find the class of "thoughts" included as a member of this list. Where is inference to come in if it is not thought? But thoughts too are taken as mere mental facts. "Under the word Thought is here to be included whatever we are internally conscious of when we are said to think."[6] These "intellectual states of

[1] 591*d*. [2] 592*a*. [3] 591*d*.

[4] 521–23, and elsewhere.

[5] A volition indeed is made up of two things: a physical effect, preceded by a "state of mind"; the latter is the "intention to produce the effect," and that belongs to the content of consciousness (51*b*).

[6] 49*a*.

mind" are just as primitive and immediate facts as sensations, for Mill "recognizes no ultimate premises but the *facts of our subjective consciousness:* our sensations, emotions, *intellectual states of mind*, and volitions."[1] We are here confronted with a curious and most significant difficulty, which brings into question the whole doctrine of immediacy in Mill's sense. For certainly inferences, knowledge obtained by reasoning, not only what we see and feel but what we "fancy that we see or feel," are all in some sense "intellectual states of mind"; they are part of what "we are internally conscious of when we are said to think." Yet this thinking, which is surely to be set in contrast with the data of inference as the very process of inference if there is such a thing as inference at all, is in turn swept back into the contents of consciousness, *all* of which are immediately given as the data of inference. The immediacy of all mental states and the genuineness of inference are thus in flat contradiction.

In the next place, how does Mill treat relations? Between facts of nature, taken in the objective sense that will come before us below, Mill recognizes the possibility of all sorts of relations; but these are all reducible to the subjective relations of coexistence, succession, and resemblance between mental states, and it is the latter that concern us here. Here we meet with the same ambiguity. Mill wavers between two positions. For these relations between objective facts are reduced subjectively either to *relations between states* of consciousness or to *states* of consciousness themselves. On the one hand, "those relations, when considered as subsisting between other things, exist in reality only *between* . . . . states of consciousness";[2] on the other hand, "there is no part of what the names expressive of the objective relation imply that is not *resolvable into* states of consciousness."[3] The peculiar significance of this ambiguity lies here, that only when these relations are taken as themselves states of consciousness can they be treated consistently with Mill's general theory of the subjective immediacy of consciousness; while only as they are treated as somehow different from states of consciousness, added to them, as it were, or involving reorganization of them, is there room for a process of inference that, while resting on immediate intuition, shall build upon it a structure of mediated knowledge. The ambiguity is indispensable to the seeming clearness of the original distinction between intuition and inference. So we find Mill asserting on the one side that "resemblance is nothing but our feeling of resemblance; succession is nothing but our feeling of succes-

[1] 520*b* (italics mine).

[2] 65*g* (italics mine). [3] 60*b* (italics mine).

sion"[1]; and on the other side that "our consciousness of the succession of these sensations is not a third sensation or feeling added to them."[2] Mill simply assumes that, because "to have two feelings at all implies having them either successively or else simultaneously," therefore successive sensations *are* somehow a sensation of succession; and so with the other relations. How this can be is well acknowledged to be a mystery. "These feelings of resemblance and . . . . dissimilarity are parts of our nature; . . . . states of consciousness which are peculiar, unresolvable, and inexplicable."[3] They are "either . . . . states of feeling, or something inextricably involved therein."[4]

The final breakdown of this doctrine of immediacy of consciousness is disclosed when a system of meanings is set up over against the merely passing, given facts. But it will be convenient to postpone a discussion of Mill's system of meanings till after we have examined his attempt to build objective out of subjective facts. We may then be able to trace more clearly the root of Mill's difficulty. But it is already evident that there is a confusion in Mill's conception of given mental facts. Indeed, it appears to involve three distinct errors, perhaps all cardinal errors of the associational school:

First, all analyzed content of experience is made subjective. The unavowed motive for this is probably as follows: The strain of attention required to analyze any content of experience, and the temporary uncertainty as to the outcome of the analysis, are used as indications that the content when so analyzed is subjective.[5] The effort, for example, to distinguish the baffling shades of green seen upon a meadow, or the evanescent chirps and hums heard in the same meadow, acts as a motive to refer back to subjective consciousness the colors and sounds when they are discriminated. In this way all phenomena when analyzed tend to become psychological, and experience is taken as composed of mental states.

Secondly, these subjective products of analysis are then regarded as genetically prior to the analysis which brought them to consciousness. Because they are now found there, it is supposed that they must previously have been there.[6] An experience which analytic attention has succeeded in differentiating into elements is taken as having been previously constructed by an association of similar elements. So the course

[1] 63*b*. [2] 60*c*. [3] 61*a*. [4] 65*b*.

[5] Mead, "The Definition of the Psychical," *University of Chicago Decennial Publications*, First Series, III, 23–38.

[6] Royce, *Outlines of Psychology*, 97–117, has an excellent discussion of this fallacy.

of experience becomes an agglomeration of original, subjective, internally fixed units. This is sensationalism combined with associationism.

Thirdly, a succession of logically independent units is expected to constitute a single experience. Mental states as mere facts are wholly evanescent, and are never repeated. How then can there be any *accumulation* in the series? At times Mill is fully aware of the difficulty, and acknowledges as inexplicable the power possessed by the series of mental states of knowing itself as a series.[1] But this inexplicability never drives him back to a reconsideration of his first assumption. Leaving the mental facts in their bare givenness and independence, he naïvely adds to them an "impulse of the generalizing propensity."[2] Now Mill is of course right in regarding generalization as most significant for the theory of inference. The whole possibility of inference to reach after and before rests on generalization. But the propensity to generalize is a somewhat startling addition to the scheme of simply associated mental states. Is it not in fact a contradiction? Given a succession of barely presented mental contents, one can suppose an addition of *more* such contents and *more varied* contents. But how could generalization get any foothold among them? What could generalization possibly mean in terms of such contents, even including immediate feelings of resemblance? The truth is that Mill has assumed, side by side with his system of mental states, a system of universal meanings. Were it not for these, inference could be only the piling up of more intuitions. With them, inference finds expression in significant propositions. The mysterious propensity of the mind to generalize is simply the illicit acknowledgment, whenever they are needed, of a system of meanings which connect the bare, passing facts of consciousness and elevate them into an organic experience.

To recapitulate, Mill starts with a sharp distinction between immediate intuition and mediate inference. The distinction, however, breaks down, because if the given facts of consciousness are made to include all the contents of experience there is no room for inference, while if we allow an element of inference in some of the facts of consciousness any facts may be equally infected and no data are left whose immediacy can be guaranteed. Mill escapes the pressure of the difficulty only because his treatment of inference is disrupted into two parts: On the subjective level he assigns the locus of inference by asserting its distinction from intuition; but he does not on this level discuss the method of inference, and so escapes the need of a criterion of its distinction from intuition.

[1] Mill, *Examination of Hamilton*, I, 260–62.

[2] 154*d*, 227*a*, *b*.

On the objective level he elaborates a method of inference, but the immediate data upon which the method must operate he assumes as already provided on the subjective level. On the one level everything is datal, with no room for inference; on the other, there is a method of inference but no starting-point for its operation. This last assertion can receive its justification, however, only after an examination of Mill's treatment of objective facts, to which we may now turn.

CHAPTER II

THE WORLD OF OBJECTIVE FACTS

The world of facts with which Mill's inferential process actually deals is a thoroughly objective world, conceived in terms of pure naturalism; not at all the world of subjective mental facts which he first assumed. When Mill is expounding its method it is these objective facts upon which inference is made to rest.

How does Mill reach this world of objective facts? Ostensibly he gets it by a process of complication of the associative connections of mental states. The complications become so involved that the original mental states drop out of sight and the complications alone remain, to form an objective world of things and events. It would be aside from our purpose to criticize this transition in detail, but we may note three fundamental characters of the objective world thus reached by Mill. A statement of these will make clearer the nature of the shift from a subjective to an objective level. It will then also be observed that they correspond closely to the three "analogies" of Kant.

In the first place, it is a world of things, existing permanently and independent of individual consciousness. The transition to this conception from that of mental states is effected by means of the conception of permanent potentialities of sensation.[1] On the Berkeleyan level, where experience of objects is interpreted in psychological terms, sensible things *are* sensations, and the existence of sensible things means their perception by the mind. Nature is but the aggregate of sensible ideas, and the uniformity of nature is a uniformity in the order of sensations. Now Mill, as we have seen, starts on this level; but by means of complicating associations he rises to an objective level, on which the permanent potentialities of sensation serve as a core around which phenomena are organized.[2] Substance is thus conceived as a fixed group or set of potentialities of sensation joined together according to a fixed law. These are not "mere vague possibilities," but "conditional certainties."[3] They are

[1] This transition is briefly described in the *Logic*, 53–54. The classical passage in which it is elaborated is in *Examination of Hamilton*, chap. xi. In both these works Mill uses the term "possibilities of sensation." In his later *Essay on Berkeley* he uses the more appropriate term "potentialities."

[2] *Logic*, 451*b*, 456*c*, 425*b*–26*a*.

[3] Mill, *Hamilton*, 238.

considered objective because of their permanence, their reliability, and their social community. First, they are permanent. "The conception I form of the world . . . . comprises, along with the sensations I am feeling, a countless variety of possibilities of sensation. . . . . These various possibilities are the important thing to me in the world. My present sensations are generally of little importance, and are, moreover, fugitive; the possibilities, on the contrary, are permanent, which is the character that mainly distinguishes our idea of Substance from our notion of sensation."[1] The object is "invested with the quality of permanence, in contrast . . . . with the temporary character of each of the sensations composing the group";[2] it "presents itself to the mind . . . . as a kind of permanent substratum, under a set of passing experiences or manifestations." "The whole set of sensations as possible, form a permanent background to any one or more of them that are, at a given moment, actual."[3] Secondly, they are reliable even when they pass outside the individual's experience.[4] "The reliance of mankind on the real existence of . . . . objects, means reliance on the reality and permanence of Possibilities of . . . . sensations, when no such sensations are actually experienced."[5] "Our sensations we carry with us wherever we go, and they never exist where we are not; but when we change our place we do not carry away with us the Permanent Possibilities of Sensation; they remain until we return, or arise and cease under conditions with which our presence has in general nothing to do."[6] Thirdly, they are socially common. For "more than all . . . . they are, and will be after we have ceased to feel, Permanent Possibilities of Sensation to other beings than ourselves." "The permanent possibilities are common to us and to our fellow-creatures: the actual sensations are not." "The world of Possible Sensations succeeding one another according to laws is as much in other beings as it is in me," "it has therefore an existence outside of me; it is an External World." "This puts the final seal to our conception of the groups of possibilities as the fundamental reality in Nature."[7] For such reasons as these "our actual sensations and the permanent possibilities of sensation, stand out in obtrusive contrast to one another"; and "the possibilities . . . . come to be looked upon as much more real than the actual sensation; nay, as the very realities of which these are only the . . . . appearances."[8]

[1] *Ibid.*, 237; *Berkeley*, 279–81.
[2] Mill, *Hamilton*, 239.
[3] *Ibid.*, 241.
[4] *Logic*, 425*c*, *d*.
[5] Mill, *Hamilton*, 244.
[6] *Ibid.*, 249–50.
[7] Mill, *Hamilton*, 242.
[8] *Ibid.*, 240.

These groupings in nature, then, no longer subsist for Mill immediately between mental states as such, but are composed of mental states only remotely or indirectly. When we once get them we forget their associational origin and treat them in an entirely naturalistic fashion.

In the second place, the relation of cause and effect holds, not of sensations directly, but of these objects. Precisely as substances are lifted from groups of sensations to an objective level, so causal connections between these substances come to replace mere associations between sensations.[1] "In addition to fixed groups, we also recognize a fixed Order in our sensation. . . . . Now, of what nature is this fixed order among our sensations? It is a constancy of antecedence and sequence. But the constant antecedence and sequence do not generally exist between one actual sensation and another. . . . . In almost all the constant sequences which occur in Nature, the antecedence and consequence do not obtain between sensations, but between the groups we have been speaking about, of which a very small portion is actual sensation, the greater part being permanent possibilities of sensation. Hence, our ideas of causation . . . . become connected, not with . . . . our sensations *as actual* at all, ... but with groups of possibilities of sensation."[2]

When this conception of causal laws has been obtained it is supposed to be carried to the farthest limit of generalization, and is treated as an absolute character of the objective world. Every event takes place according to a fixed law of sequence, and the whole universe is law-abiding. Mill attempts to deduce this causal character of the whole course of the universe, somewhat as he did its independent existence, by a complication of subjective association;[3] but here even more obviously than there he must leap to another level before there is any place for the

[1] Mill, *Berkeley*, 288.

[2] Mill, *Hamilton*, 239–40. There is much confusion in Mill as to the place of sensation in the causal scheme. Objective things, as potentialities of sensation, apparently *include* all actual sensations as that part of their content which happens to be experienced. If so, how can sensations be given a place as distinct links in the causal series? This is to duplicate them. This is similar to the difficulty in Kant of referring sensations to things in themselves as causes of the sensations, although causation is properly a category only of the phenomenal world, which consists of objectively organized sensations. This confusion in Mill suggests the difficulty found by neo-realists in assigning to consciousness a place in the realistic scheme. The following passages in Mill's *Logic* may be consulted in this connection (46*a*, 49*b*, 51*a*, 52*e*, 57*b*, 63*b*–64*a*, 81*b*, 82*c*, 242*b*, 451*b*, 589*d*–90*a*).

[3] 397–405.

conception of objective things and laws. Ostensibly a generalization from particular causal connections, it is taken as an absolute assumption by which each of them may be tested.

That the two characters of the objective world already referred to are really assumptions independent of the subjective basis on which they are ostensibly grounded becomes all the more evident when we consider its third character, which is in a sense the limit to which the other two in combination are pushed. For, in the third place, Nature is taken as a single, unitary whole; its objects, through the interaction of their properties, forming a completely interrelated system, whose operations are absolutely determined. "The state of the whole universe at any instant we believe to be the consequence of its state at the previous instant; insomuch that one who knew all the agents which exist at the present moment, their collocation in space, and all their properties, ... could predict the whole subsequent history of the universe." "The whole series of events in the history of the universe, past and future, is . . . . capable, in its own nature, of being constructed *a priori* by anyone whom we can suppose acquainted with the original distribution of all natural agents, and with the whole of their properties."[1] How remote is such a universe from an accidental agglomeration of given mental states! Mill has certainly passed here completely to an objective and universal level.

Such is the naturalistic scheme within which Mill, when he presents the method of inferential procedure, looks for the data of inference. While we may find that it evinces internal difficulties which unfit it for this purpose, it certainly offers a sphere for the operation of inference very much more hopeful in appearance than that of immediate subjective states. The objective scheme which Mill has thus obtained bears a striking resemblance to that of Kant.[2] The three features to which we have called attention correspond closely to the three analogies of Kant

[1] 250*c*–51*a*.

[2] Professor De Laguna, *Dogmatism and Evolution*, 179–82, calls attention to this resemblance, but in the main rejects it, on the grounds, first, that "the forms of connection which Mill considers . . . . are not intuitively known or assured," and secondly, that "it can never be asserted that a given description of any form of connection is adequate or final." But the general causal scheme, which is the factor in Mill corresponding to the Kantian categories, is taken as absolute. Kant, on the one hand, recognizes that *specific* causal laws must be learned from experience; while, on the other hand, the *form* of connection, when Mill once gets it, operates in as absolute a sense in Mill as in Kant. It is "adequate" and "final." See such passages as 237*a*, 250*c*–51*a*, 345*c*, and 547*e*–48*a*.

as organizing principles for experience, and the correspondence can in fact be pointed out in considerably fuller detail than the present purpose will permit. Is this resemblance merely superficial, or is it significant?

There are of course obvious differences. Mill set out from an empirical standpoint, and intended to remain an empiricist. He repudiated any contribution to experience by the structure of the mind itself, and tried, as we have seen, to trace the growth of even the most fixed forms of nature from the simplest associative connections. Certainly Mill did not mean to be a Kantian. Yet the resemblance is not without significance. Mill has moved a considerable part of the way from Hume to Kant.

Hume and Kant both assume a congeries of mental states to start with. For both, these mental states are organized into objects. Kant's principles of organization are independent of the content; they are formal, contributed by the intelligence to the content. Hence the organization of the object has universality and necessity. Hume's principles of organization reside in the content, and are reducible to the principle of custom, or habit, which operates through contentual laws of association. Such organization of objects cannot have universality and necessity, for it rests on mere expectation, and the actual connections may change at any time. Change of organization, while it may surprise, does not rob the object of what for Hume renders it an object. Now what sort of organization of objects does Mill employ? He starts with that of Hume, and avows it to the end. But after professing to deduce substance and causality as higher complications of empirical association (or habit based on mere empirical relations of content), he *uses* these objective principles of substance and causality (together with the principle of an absolutely reciprocal system of nature which he could not even profess to deduce by association) as though they were absolute principles which he can bring *to* the content of experience. Though he would never have avowed their seat in the constitution of the knower, he assumes their universality and necessity.[1] That is to say, he uses them just as Kant did. Kant had shown that universality and necessity of objects must be assumed independently of their content; and in unconscious accordance with this Mill assumes a universality and necessity that, as we have seen, could not have been properly reached by his associational construction of substance and empirical proof of causation. To be sure, Mill does not admit the conception of necessity; but he has a double use of the idea of universality, one of which amounts to the

[1] Compare Joseph, *Introduction to Logic*, 376 ff.

same thing. That is universal in one sense which happens to be uniformly experienced, and that is universal in another sense which is uniform in nature whether experienced or not, and probably in no case unambiguously experienced; this latter cannot be distinguished from formal necessity. Indeed, Mill's unconditional universality,[1] with its exclusion of transient force,[2] is precisely Kant's necessity. His scheme of objective nature, then, is Kantian rather than Humian.

The significance of this conclusion for our purpose lies in this, that the two modes of organizing experience allow a very different place for inference. Hume relies directly on custom, and gets no place at all for inference; mental states simply are or are not; they are all equally immediate. Kant relies not at all on custom, but believes himself to be in possession of a system of organizing principles independent of experience, which put objects into genuinely objective relations, and seem to make a place for inference regarding them. Now Mill holds substantially each of these positions in turn. He relies indirectly on custom, and so far as he does so has no place for inference, as we saw above; but when he has thus reached his objective principles of organization they *then* work with a universality unlike that of Hume and like that of Kant. Mill therefore is able to produce a *logic* which was impossible to pure associationism. And his logic, in practically all of its actual construction, can be regarded as based on a purely naturalistic foundation. After once getting to the level where its procedure is worked out, Mill's logic is no longer sensational and associational, but realistic, and must be judged on that ground. One motive, it is true, among others in constructing his logic was to vindicate the associational philosophy by showing that a logic could be built upon it,[3] but such a vindication would of course have to rest in part upon the cogency of the transition from the subjective to the objective level, as well as upon the adequacy of procedure of a quasi-realistic logic after the objective level has been reached. We have tried to show that the transition is not cogent. The difficulties of the realistic logic to which it leads Mill will appear below.

[1] 244*c*–46*c*.

[2] 236*d*.

[3] Mill, *Autobiography*, 226.

CHAPTER III

THE UNIVERSALITY OF ATTRIBUTES AND PROPOSITIONS

So far we have considered Mill's facts, whether subjective or objective, as bare particulars. This is entirely fair to Mill's official and avowed empiricism. But such facts would be of no service to the logician; for they would be completely cut off from each other, giving no play for an interpretative process to bind them together. Facts as mere facts are never repeated. Mill accordingly imports into them a universal element by endowing them with attributes. This he does quite naïvely, not suspecting that in using attributes in a universal sense he has abandoned his original attitude toward facts.

We have already met with attributes in Mill's discussion of facts as the data of inference. We must now consider their function more particularly. Attributes serve Mill in three ways: first, to reinforce the ultimate identity of subjective and objective facts; secondly, to furnish a bond of unity between facts; thirdly, to give content to propositions. This last function of attributes is consciously avowed by Mill; the service of the two former is somewhat surreptitious.

In his use of the word attribute Mill glides from one meaning to another. At first the attribute is the quality of the sensation, already giving the sensation a universal aspect.[1] The attribute is then transferred to the thing, as the power the thing has of exciting a sensation.[2] This mode of statement is first suggested very hesitatingly, but later accepted without reserve.[3] The exciting of actual sensations at length falls out entirely, and attributes become the mere potentialities of causing them.[4] The world of nature, with all its objective causal relations, can then be described as a realistic system in terms of attributes, now under the name of properties.[5] Thus attributes carry Mill over by an easy transition from subjective to objective facts.

Again, the attribute is the universal element needed by Mill to bind together his merely particular facts. Attributes give meaning to such facts precisely by their universality, and the particulars could get meaning in no other way. So Mill's doctrine of meaning is one of intention, not of extension. "We may frame a class without knowing . . . . any

[1] 57*e*, and many passages.
[2] 57*f*–58*a*, 58*c*.
[3] 63*b*.
[4] 86*a*.
[5] 250*b*–51*a*.

of the individuals of which it may be composed; we may do so while believing that no such individuals exist. If by the *meaning* of a general name are to be understood the things which it is the name of, no general name, except by accident, has a fixed meaning at all. . . . . The only mode in which any general name has a definite meaning, is by being a name of an indefinite variety of things; namely, of all things, *known or unknown*, past, present, or future, which possess certain *definite attributes*."[1] This seems to give something very like a world of meanings over against a world of facts. The meanings are fixed in themselves, and it is a mere accident whether any corresponding particular exists or not. "General names . . . . have a meaning, quite independently of their being the names of a class. That circumstance is in truth accidental, it being wholly immaterial to the signification of the name whether there are many objects, or only one, to which it happens to be applicable, or whether there be any at all." "Every name the signification of which is constituted by attributes is potentially a name of an indefinite number of objects; but it need not actually be the name of any."[2] It is quite true that Mill denies to these meanings an objective existence; attributes are not real things.[3] Yet the meaning spills over the particular fact, and proves to be an identity above the particulars. Spencer criticizes Mill on this ground, charging him with confounding likeness of attributes and their identity. Mill rejoins that likeness of attributes *is* identity: "The common something which gives a meaning to the general name, Mr. Spencer can only say, ... is the similarity; . . . . and I rejoin, the attribute is precisely that similarity. . . . . The things compared are many, but the something common to all of them must be conceived as one."[4]

Mill stands here in a position of unstable equilibrium. For him nothing but particular facts can be actual; his entire empiricism is here at stake. Yet the particular can be expressed in terms of attributes, and each attribute is identical, in however many facts. It is an absolute universal. Even further, as we have seen, an attribute need not actually imply a fact at all. The attributes *as such*, then, present a timeless system of characters without particularity.

Mill here betrays the inevitable difficulty of assuming that particular facts are independent and isolated. This is due to a failure to realize

[1] 78*e* (italics mine).

[2] 94*b*. Cf. 84*a*. In neo-realistic terminology it may be the name of a subsistent, not an existent.

[3] 136*e*.

[4] 137*c*; Spencer, *Principles of Psychology*, 125–27.

that it is impossible to speak of particular facts without implying the presence of a person that has an interest in the facts, and to whom therefore they are not mere particulars. Provisionally and for certain purposes, to be sure, it is necessary to treat facts as independent; but their independence is still the way they are *being treated*. The results of the logical process cannot be made valid in absolute independence of the interest in that process. An attribute is *attributed*. Particulars and universals are strictly correlative. Any attempt to get a logic out of *mere* particulars therefore puts one under compulsion, whether surreptitiously, like Mill, or avowedly, like Bradley, to read into the particulars a system of absolute universals.

In the next place, it is this universality of attributes that furnishes Mill a content for the proposition. This will appear as we examine his doctrine of propositions.

Mill uses the term "proposition," rather than "judgment," because he regards the latter term as emphasizing too much the mental processes involved. It is the import, not the psychology of the judgment, in which he is interested, and this he thinks is best expressed in the term "proposition."[1] This choice of terms serves to bring into clearer setting the transition from an associational psychology of particulars to a logic of universals. For the import of a proposition is supposed to be quite independent of belief. It is subject to belief, but is not constituted by belief.[2] The import is the universal meaning of *what* is asserted in the proposition, and is not conditioned by the way in which the assertion arose, or the service rendered by the assertion to the one making it.

Mill does not fully face the difficulty of reconciling such a theory of propositions with his empiricism. His first analysis of the proposition as an assertion *of* something *about* something, upon which he dwells at length,[3] takes its cue superficially from the verbal form, and for our purpose it can be passed over. Much more significant is Mill's account of the proposition as an assertion about facts. The true subject of the proposition is one or more facts.[4] Indeed, matter-of-fact and assertion are expressly identified.[5] But how can this be? Mere particular facts as such are not asserted; they merely are. The assertion of a fact surely implies a standpoint outside the fact. How then can facts get into propositions?

[1] 73.

[2] Contrast 27*c* with 21*b*, 73*a*, 74*a*, and 75*b*.

[3] 67*d*, and elsewhere.

[4] 121*b*.

[5] 83*b*.

Facts get into propositions by virtue of the universality of their attributes. Matter-of-fact and import of proposition are identical[1] because every fact can be expressed in terms of universal attributes. The particular existence of a fact is overflowed by its universal character, and it is the latter that gets recognition in Mill's proposition. Bradley's vigorous attack on Mill's associationism leaves this out of consideration. If Mill had remained a consistent associationist, Bradley's strictures would apply; and they are no doubt justified in so far as Mill fails explicitly to acknowledge a system of universals. But they ignore the use which Mill makes of the universal character of every fact in his doctrine of import. Mill rides two horses, not always very steadily keeping them abreast; it is not entirely clear, however, that Bradley does better to reduce the two to a double-natured monster, with existence and meaning inside one skin.[2]

The difficulties of the position, if no greater in Mill, are perhaps more obvious, and therefore more easily pointed out. The particular fact, taken as merely given, and *as such* independent of the knower, has to be matched with a universal meaning, belonging to an absolute system of meanings, with an import also as such independent of the knower. The universal character of attributes has played the trick. Committed from the start to particular facts, Mill finds these facts capable of description in terms of universal attributes, which forthwith give content for universal propositions. Such is the transition from givenness to import, from fact to proposition.

The import of propositions assumes a system of time relations, a system of space relations, and a system of qualitative universal attributes. Different attributes may evidently bear to each other time and space relations, and an identical attribute may appear in different times and spaces. These assumptions were not explicitly systematized by Mill,[3] but they lie at the basis of the three fundamental relations of matter-of-fact asserted in propositions: coexistence, succession, and resemblance.[4] To these Mill adds two other relations: existence and causation. Existence is in the last analysis apparently reducible to the others. Causation is a very special form of succession into whose significance we must inquire later, when we consider the problem it presents to inference.

[1] 83*b*, 85*b*.

[2] Bradley, *Principles of Logic*, in various relevant passages; see especially Book II, Part II, chaps. ii and iii.

[3] As they have been, for example, by the neo-realists.

[4] 80–85.

The whole import of propositions reduces at last to accompaniment of attributes.[1]

In this view of the import of propositions Mill seems to have brushed aside the particulars in nature and to have grasped its universal laws. Nature operates always in accordance with ultimate laws that cannot fail to be universal. A complete statement of them would be a complete account of nature. Our propositions are attempts to approximate such a statement. "We are not sure that any of the uniformities with which we are yet acquainted are ultimate laws; but we know that there must be ultimate laws; and that every resolution of a derivative law into more general laws brings us nearer to them."[2] The whole course of nature, it seems, is statable in terms of propositions, and the business of inference is to approximate as closely as possible to such a statement. It matters not what prompted the statement, for the psychology of belief is irrelevant; the statement if correct expresses an accompaniment of attributes as it is in nature, entirely objective, wholly determined, and absolutely universal. If nature in one aspect consists solely of particular facts, in another aspect it consists of universal laws. In his scheme of inductive inference Mill attempts to bring these together, though the result is rather to oscillate between them than to harmonize them.

[1] 80*c*, 85*d*.

[2] 345*c*.

CHAPTER IV

INFERENCE AS ANTICIPATION OF FACTS

There are two ways of looking at inference. To distinguish them will give us a point of view from which to criticize Mill's account of inference. On the one hand, inference may be viewed as a process, whereby knowledge is genuinely increased and there is an actual reconstruction of content. On the other hand, it may be viewed as a relation *within* content, by which one part of the content implies another. From the first point of view, in describing any case of inference we are bound to consider the state of knowledge of the person that makes the inference, both before and after the inference is made, and to see what has *thereby* happened to his knowledge and why it happened. Inference thus considered is the reconstruction of a specific situation. If, in the light of the knowledge obtained *by* the inference, we *then* try to state by what right the inference was made, we pass over into the other view of inference. The inference is then no longer a reconstruction *of* content, but a relation *within* content. Now the formal analysis of inference always ignores the *process* of reconstruction. It is bound to take its stand in the light either of the lesser knowledge preceding the inference or of the greater knowledge succeeding the inference; usually the latter. In either case the inference as a movement of thought disappears. For in the earlier content taken just as it stood there was no implication corresponding to the inference; that is, in the light only of the knowledge previous to the inference the inference cannot be seen as valid, for if it had then appeared as valid *it would already have been made.* But in the light of the fuller knowledge after the inference, the inference *would not need to be made;* so that when the content of the later knowledge is analyzed to find an inferential relation within it the inference appears to be tautologous. Taking inference then as a relation within a fixed content, it *must* be either invalid or tautologous; the premises either involve the conclusion or do not.[1] In the study of inference there is of course a place for formal analysis; it need not mislead if, while we provisionally take that point of view, we expect the inference as analyzed

[1] "If the Syllogism yields novelty, it begs the question. If it disclaims novelty, it becomes vain repetition. As a form, therefore, it is either futile or false" (Schiller, *Formal Logic*, 208). This applies to all formal proof.

to appear either tautologous or invalid. We can at once escape this dilemma by returning to the other point of view, from which we consider the inference as it was actually carried through. To do this with full consciousness of what it means would reconstruct the formal analysis of inference, and would relegate it to a subordinate place.

It is to the credit of Mill that in his theory of inference and its relation to fact he set out to introduce a logical reform of this kind. He proposed a logic of truth instead of a logic of consistency.[1] He made inference pass from the known to the unknown, a process of discovery. It was to proceed from particular facts, and to lead to particular facts. Mill certainly was feeling for the concrete process of inferential reconstruction. Yet in detail he failed to maintain this attitude. His conception of facts as definitely given interposed itself, and prevented him from appreciating the concrete and really significant reconstructive function of inference, so that he fell back into the formal attitude toward inference as a relation of content. Endeavoring then to extricate himself from this formal position, and to recover the reconstructive process of inference which he had lost, he comes upon the experience of actual discovery, but regards it for the most part as only subsidiary to inference, and even to the end fails to grasp its real function in inference and its true relation to fact.

In this way Mill oscillates between three quite different conceptions of inference. The conception with which he sets out is that of anticipation of experience. On the ground of given facts other facts are anticipated. His formula for such inference is "from particulars to particulars." The establishing of this as the character of inference Mill believes to be a vindication of empiricism.[2] A universal need not intervene between the particular facts on which the inference is grounded and the particular facts to which the inference points; if a universal does intervene it is accidental, merely a convenient safeguard against error. Nevertheless it appears that a universal always *could* be made to intervene, and if an inference is justified at all, then by the same token a universal is justified. Thus Mill comes to the second conception of inference as the proof of universal propositions. The main body of his inductive technique is built on this conception. But inference as the proof of propositions cannot finally leave out of account the source of propositions, the way in which they come to be proposed for proof. Inference, in short, is variously considered by Mill as the anticipation

[1] 25, 236*c*.

[2] Liard, *Les Logiciens Anglais Contemporains*, 5th ed., 24–27.

of particular facts, the proof of universal propositions, and the discovery of universal propositions, though Mill seems unaware that he has shifted his ground in passing from one to the other. Mill is not at fault, indeed, in holding to these three conceptions as genuine aspects of the inferential process; his error is in treating each in isolation from the others and in misconceiving the relation of each to facts. Let us examine each of the three in turn.

Mill finds inference generally acknowledged to be of two kinds: inference from particulars to generals, and from generals to particulars, or induction and ratiocination, the latter being expressed in the syllogism.[1] Mill upholds a third type of inference, not only as valid, but as "the foundation of both the others." Indeed "all inference is from particulars to particulars."[2] A universal may or may not intervene; if it does, it merely breaks up the inference from particulars to particulars into two parts, the first ending with the universal, the second beginning with it. The actual inference is always from particular facts to other particular facts, and whether it passes through the universal on the way or leaps directly from facts to facts without a universal does not alter the nature of inference as such. The general proposition is merely a register of inferences already made from the facts, or a formula for making more.

The doctrine then is this, that inference is in its nature a passage from particular facts to other particular facts[3] without the necessary mediation of a universal. There are several fundamental difficulties in this conception of inference.

First, there *is* such a process in experience, but it is unreflective, and cannot properly be called inference. It is *habit*. When Mill offers examples of inference which shall be purely from particulars to particulars, he finds himself reduced precisely to cases of habit.[4] The avoidance of fire by the child, and by the dog as well, and the skilful use of weapons and tools—these do involve anticipations of experience on the basis of previous experience, but they are not logical processes. In some cases they may have grown out of an earlier inferential process, but they need not have done so. They may rest on purely unreflective association. The mother who prescribes a remedy to a neighbor's child because it cured her own Lucy[5] can scarcely be supposed not to make some use of a "general proposition"; but if she does not, as Mill assumes,

[1] 125*c*.

[2] 146*c*.

[3] Or to one other.

[4] 142*d*, 143*a*, *c*, 144*a*, *b*.

[5] 143*b*.

then she has made no inference at all, but repeats an operation under repeated circumstances by mere force of habit.

Secondly, when action rises above mere habit and becomes reflective, a universal is required. A particular, if reflectively taken *as* a particular, implies a universal. Mill begs the question when he finds himself bound to call the particular facts "cases."[1] An inference from facts to facts is justified only if both sets of facts are seen to be cases; cases, that is, to which the same rule will apply; cases of the same universal.[2]

The emphasis on the universal, it is true, may be shifted either to the beginning of the inference or to the end The universal may then be alternately located at either end of the process. If the cases *from* which one infers are considered as particular, then any case *to* which one infers is only one of an indefinite number of possible cases, or is the application of a law. If the cases *to* which one infers are considered as particular, then they are anticipated on the basis of the law which was exemplified in the cases *from* which one infers. That is, one infers either from particulars *to* a law which includes other particulars or to particulars *from* a law that is exemplified in previous particulars. One may be more concerned under given conditions with the origin or with the application of the law, but cannot dispense with it as essential to the inference. Mill seems to do so only because he oscillates from one end of the process to the other, in each case leaving the universal to operate at the opposite end. In the one case the general proposition is a register of observations, and the inference is still to take place;[3] in the other case the inference has already taken place, and the general proposition is a formula for making more inferences like it.[4] Between the two the inference plays successful hide-and-seek with the universal.

That inference cannot dispense with a universal is due to the hypothetical character of the latter. The universal cannot itself be experienced, and is never a mere record of past experience. It represents a hypothetical interpretation of *any* future experience so far as it can be taken in terms of the past experience.[5] Past experience points to like future experience *if* it is really the same. *If* the unobserved particular *is* a similar "case," the inference is valid. The transition through the "if" signifies the mediation of a universal.

[1] 125*e*, 141*d*, 149*a*.

[2] "A general truth is but an aggregate of particular truths; a comprehensive expression, by which an indefinite number of individual facts are affirmed and denied at once" (141*d*). But "aggregate" and "indefinite" are contradictory, and this contradiction lurks everywhere in Mill's treatment of "cases."

[3] 141*c*, 147*b*, 151*b*. [4] 142*a*, *b*, 148*b*. [5] 150*e*.

What do we mean by the universal in inference, and why is it needed? It is true that all problems and all solutions and therefore all inferences are specific. Had Mill, by the use of his formula "from particulars to particulars" intended to support this aspect of inference, he might well have pressed it farther than he did. But he omitted the reflective element of inference, the necessity we are under to carry with us a set of possible interpretations of new experience. This interpretative tendency is the universal; it is what renders inference reflective where habit would be unreflective. In actual use the universal has no absolute meaning. Absolute meanings are fictions of the logician. When we interpret what we take to be the new "cases" in "the light of" the old, that *light* is the universal.[1] It is the deliberate readiness to treat them, when under the pressure of uncertainty, *as* cases. General language has crystallized these interpretations into a highly elaborate system, with its own technique; but the relative independence and permanence of the language must not be allowed to obscure the essentially instrumental character of the universal which the language expresses. It is here that Mill failed to free himself from the conceptions of formal logic, and let go the very factor which would have revitalized his system: the play of the universal as the reflective interpretation of new experience in the light of the old.

Thirdly, Mill's attack upon the syllogism as a *petitio principii* is due to this failure to appreciate the interpretative function of the universal in the actual *process* of inference. All inference, if treated as he treated the syllogism, becomes a *petitio;* for the syllogism avowedly expresses the content of the inference after it has been made, and is therefore tautologous. *All* inference, when passed through and looked back upon, must appear tautologous; if its content did not admit of tautologous statement it would be invalid. Mill's strictures apply equally well to his own inferences from and to particulars. Are the earlier and later facts both "cases"? If they are not, the inference is not valid. If they are, then no inference is needed; for the later cases merely add themselves to the earlier as *more of the same.* Just so long as Mill takes the content of his particular facts in the same fixed and unquestioned way in which he takes the premises of the syllogism, all actual inference is inevitably shut out.

[1] Through the collision and breakdown of habits their content becomes reflective. This reflective content of what was a habit is now a universal. We continue to gain universals in this way; but after this type of experience is once established the system of universals may be built up in other ways, as by verbal instruction. The materials of the universal must always have arisen out of what was unreflective.

Fourthly, this suggests the difficulty that in Mill's scheme of inference the fundamental function of inference in meeting an attitude of inquiry is ignored.[1] Mill takes the knowledge of certain facts and proposes to infer other facts from them. If this is merely the addition of more facts it is not inference, as we have seen. It is inference only if the facts are not adequately known. In any actual case of inference the primary problem is to ascertain *what are the facts*. We should have no occasion to think of facts in a situation that—so to speak—was all fact. A "question of fact" emerges because the situation contains more than mere fact; it contains (1) certain contradictions or difficulties that impel to further inquiry about facts; (2) various more or less tentative constructions which aim to clear away these difficulties.

Here we strike the root of the matter. Mill has a favorite formula for inference which describes it as procedure from the known to the unknown.[2] This formula may no doubt be given an interpretation which renders it a correct description; but it is quite as correct to say that inference is procedure from the unknown to the known. When facts are adequately known there is no occasion for inference. But when our knowledge of the facts breaks down, and it is not known just what the facts are, then inference comes in as an effort to interpret the facts in such a way that they shall be adequately known. Inference, one might say, aims to transform the unknown into the known. The relation between inference and facts is never so simple or so one-sided as Mill supposes; it is a relation of mutual dependence.

In view of this attitude of inquiry that underlies all inference it is necessary to reject in principle the sharp distinction Mill maintains between the earlier cases which justify the inference and any later case to which it is applied, though in the practical technique of inference the distinction has a relative value. The facts which prompt the inference are first determined as "cases" *by* the inference, which is designed to meet one of the two questions: "*Of what* are they cases?" or, "*Are* they *really* cases?" They are therefore the very facts to which the inference applies. It is true of course that an inferential situation may be extremely complex, some factors in it more fixed, others more fluid; and at successive stages of the process it may be useful to consider some the data and others the conclusion. Yet in principle Mill's sharp separation of the data and the conclusion must be denied. In inference we do not

[1] This consideration has been well worked out by Professor A. W. Moore, of Chicago, in a seminar on "Modern Logical Theories," to which the writer is greatly indebted.

[2] 125*b*, 126*a*, 139*a*, 210*e*, 223*d*–24*a*.

first get a set of facts, ticketed and fully known, to serve as data of an inference, and after an interval another fact conveniently ticketed to receive the application of the inference. That, as we have seen, would be a fair description of the operation of habit, if under knowledge of anything we were to include any ability to deal with it. But it is not a correct description of inference. In inference the data and the conclusion must come together in organic relation, and it is precisely at the point where they do come together in a single interpretation that inference takes place.

In short, Mill's account of inference from particulars to particulars, which actually applies better to habit, implies two situations, an earlier and a later. He oscillates between these, because he seems vaguely to have perceived that in either of them inference *may* appear. There is no inference unless some factor in the situation is brought into question, but the question may turn upon the formulation of a new universal or upon the selection of an old universal. In both formulation and selection of a universal the "cases" are seen to be such only in relation to the universal, but in the one the question looks toward the universal, in the other it looks from it. This is to say that either the major or the minor premise of a possible syllogism may be placed in question. Mill is right in breaking inference from particulars to particulars into two parts; but wrong in considering the universal an unessential division-point between them. He is right in excluding inference sometimes from one part and sometimes from the other; but wrong in denying that it may be in either.

Indeed, Mill's position is shifted when he comes to consider the technique of inference. He virtually recognizes the necessity of the universal when he acknowledges that any data which justify an inference to a particular will justify an inference to a universal as well,[1] and that the validity of the inference can be shown only by drawing the universal explicitly.[2] Thenceforth in his discussion the process of inference is made to consist in the establishing of general propositions. He might well have explicitly taken the same step with reference to the second half of his original type of inference, in the selection of a universal to explain a given situation. He admits this to be often a most arduous intellectual process, but refuses—though not always consistently—to grant it the status of inference,[3] on the ground that it is invention, and "invention cannot be reduced to rule." These two phases of inference remain to be considered in the next two sections.

[1] 148*c*–49*a*, 155*c*, 208*a*. [2] 154*d*–55*b*. [3] 208–9.

CHAPTER V

INFERENCE AS PROOF OF PROPOSITIONS

The distinction just noted between the establishment and the selection of a universal proposition enables Mill to pass over to a second conception of inference. Before examining the latter it will be well to note again the exact point of the transition. Mill has established, he believes, the general character of inference as a passage from certain particular facts to certain others. But if these certain facts justify the conclusion about any others at all, they justify the conclusion about any others whatever of the same description. Accordingly from premises which justify any conclusion we can always draw a general conclusion. The problem of application, the problem, namely, whether the later facts *are* of the same description, or of *what* description they are, is thrown out as irrelevant to inference, because it cannot be reduced to rule; it is apparently too psychological. This leaves for inference only the problem of drawing the general proposition from the data, the problem of induction.

But this is not all. There is a still further limitation in this conception of inference as induction. It is not the discovery of general propositions but their proof with which he concerns himself. The type of question which his machinery of induction is designed to solve is not, "What proposition is true?" but rather, "Is a given proposition true?" Mill set out, it is true, with the intention of providing a logic of discovery,[1] of the process of advancing from known truths to unknown.[2] Logic is to investigate the "pursuit of truth,"[3] of "how we come by that portion of our knowledge (much the greater portion) which is not intuitive."[4] But he makes this synonymous with "estimation of evidence,"[5] and falls back at once into a formal logic of proof.[6] "Our object," he says, "will be . . . . to . . . . frame a set of rules or canons for testing the sufficiency of any given evidence to prove any given proposition."[7]

Why did Mill's conception of inference become so completely that of proof? There were probably two reasons, both suggested in the words just quoted. The first is extrinsic to the character of his theory, and is due to his desire to provide, in a logic of induction, a set of "rules and

[1] 208*a*. [3] 19*b*. [5] 23*b*.
[2] 23*b*. [4] 27*b*, 51*a*. [6] 121*a*, 21*b*, 45*a*, 88*b*, 208*d*. [7] 23*c*.

canons" that would emulate those of the formal deductive logic in which his father had given him so rigid a training; Mill certainly took great satisfaction in the formulation of his "inductive methods."[1] The other reason is intrinsic to the theory itself, which drove him back to "given evidence" for "given propositions." Facts for Mill are always *given*, whether subjective facts of immediate consciousness or objective facts of the system of nature. The proposition is likewise given, for it is the universal meaning of the facts, to be read off from them as they come together.

The universal propositions the inductive proof of which constitutes inference are of various kinds. They include the statement, for example, of spatial and numerical relations.[2] It would be interesting to trace out the relation of inference to matter-of-fact in these, and to inquire whether it is consistent with Mill's general treatment of induction. That treatment, however, is based almost entirely on the establishment of causal relations,[3] and the present criticism of Mill must be limited to this field.

The character of induction as proof is rooted in Mill's realistic scheme of nature. (1) Nature consists, as we saw, of certain things, having certain attributes and in certain collocations. (2) Every change takes place according to a uniform law of succession, each event following and preceding certain other events according to such a causal law. (3) Nature is a single system of such things and events. This whole system of nature is conceived as definitely determined and proceeding on its way independently of us.[4] To be sure, we are not acquainted with all of it, but we are certain that it is all of this character. When we wish to know what the laws of sequence in nature are we must watch the shuffle of facts and observe which go together. Our experiments may vary the shuffle, but the principle of noting the shuffle is the same. The very possibility of identifying the facts in the shuffle rests upon the universal character of their attributes, and the assertion of the accompaniment of certain attributes *is* a general proposition. It would seem, then, that discovery and proof are essentially identical. We *find* accompaniment of attributes so far as, within the field of our observation, there *is* accompaniment of attributes. The facts that teach us the law prove the law.

[1] Mill hoped that his *Logic* might serve as a *Novum Organum* of real practical value. See *Logic*, 579–80; *Autobiography*, 226. Cf. Joseph, *Introduction to Logic*, 342.

[2] 234*d*.

[3] 235*b–d*, 236*c*.

[4] These are the "three analogies" in Mill, as noted above.

This would seem to be a fair statement of the general conception of proof which underlies Mill's theory of induction. But the matter is not so simple as it seems. There are grave difficulties raised by it. Partially recognized by Mill, they compel him to introduce deviations in the procedure of induction. Fully faced, they would lead to a reconstruction of its underlying principles. Three such difficulties require our consideration:

First, the inductive methods are all recognized by Mill to be so many means of elimination.[1] But elimination is not proof; it is *disproof*. Elimination must obviously operate upon alternatives; and the very point of the elimination is that neither of the alternatives is proved till at least one other is disproved. There must be a tentative consideration of various apparent uniformities in order that the methods shall have play in the rejection of those which are actually non-uniformities.[2]

Mill might be supposed to answer that this is just what nature does for us. Out of the chaos of sequences, some accidental and some uniform, the accidental are eliminated by the circumstance that they do not recur, which is the principle of the methods, ignoring for convenience their finer complications. But *there is no elimination whatever in nature*. The facts are all there, and they stay there. Nature is wholly careless whether she presents uniformities or non-uniformities. It is the reflective attack upon nature that uses the methods, and their eliminative procedure is exercised upon the tentative efforts to interpret the facts; that is, to find out what the facts really are. Mill's proofs are disproofs: disproofs of propositions not given ready-made by the facts that furnish the disproofs.

Where, then, do the propositions come from? Whence arise the assertions about the facts, the interpretations of fact, which are then proved or disproved? To ask such a question, it must be replied, is very likely to imply just Mill's misconception. We have no system of facts, complete and ready-made, with which to check up our interpretations for elimination. There is a constant interplay between fact and interpretation, each reconstituting the other. The only facts we have are the facts as we have successfully interpreted them, and our interpretations always arise as tentative statements *of* the facts. Again, the operation of proof and disproof is strictly correlative with the presentation of propositions to be tested out; neither can be supposed without at least a tentative form of the other. Nature no more offers a series of

[1] 278*d*, 279*e*–80*a*, 281*a*, 310*b*.

[2] I.e., which are not unconditionally invariable.

prepared "evidences" ready to apply to any given proposition than she provides the propositions ready-made. Facts are not all in nature, inferences all in us. Facts likewise grow in the soil of inquiry, and are the fruits quite as much as the roots of our inferential control of nature.

The second difficulty is due to the impossibility of determining the limits of a fact out of relation to the character of the inquiry about the fact and the proposed interpretation of the fact. It is the difficulty, in any inquiry regarding cause and effect, of setting the limits of an event.[1] Mill is already feeling this difficulty when he draws his distinction between causation as practically and philosophically understood.[2] Causation, according to his own program, is to be understood in the latter way; that, he holds, is the conception underlying genuinely scientific inference, and is based on the facts of nature as they really are. For practical purposes, indeed, we are content to note a selection of the conditions of an event and to call them the cause, or to take two events whose succession is more or less mediate and call them cause and effect, without taking account of all the possible counteracting conditions that might have intervened. But in philosophical strictness we should do neither the one thing nor the other. Philosophically, causation must admit no omissions and no loopholes.[3] Now, having set this up as a demand, what Mill actually does in various illustrations is to contrast more *nearly* philosophical with less nearly philosophical statements of concrete cases of causation, but all his illustrations are statements of approximation only; they never exhibit a single case of causation in the full "philosophical" sense. And they do not because they cannot.

[1] The best discussion of this difficulty seen by the writer, though without special reference to Mill, is in Sidgwick, *The Process of Argument*, chaps. x and xi. A few sentences must be quoted. "The question where does an occurrence end and 'another' begin is unanswerable except by an artificial distinction drawn to suit our practical purposes." "This kind of analysis may be carried much farther. Given any two steps in the series, we know that some occurrence comes between them, however short the interval, and that this intermediate occurrence . . . . has just as much right to be classed as belonging to one end of the chain as to the other. It is not properly a chain, in fact, but a stream, or a continuous growth like that between bud and flower." "No one seriously denies that the links are there, but our practical needs do not always compel us to explore them." "The separation into Cause and Effect is done for a purpose, and its value depends on its serving that purpose. Whenever a hitch occurs we are bound to look more closely into the details of the connection." "The line we draw between antecedent and consequent is an artificial one; they are more or less ill-defined parts of a whole which it suits us to pull asunder."

[2] 240*c*, 241*a*.

[3] *Logic*, Book III, chapter v as a whole.

For if Mill were to be pressed on the point, he would find himself completely locked in by the Kantian antinomies. The continuity of time and space renders all change continuous, and there is nothing in the facts taken as they merely "are"—assuming they could be so taken —that would ever indicate the limits of an event, either serially or in section. The continuity of all process in space and time, and perhaps also in qualitative degree, renders the singling out of any "event" possible only when relevant to a purpose. Mill admits this for "practical" causation, but he has to assume it covertly for all causation.[1]

The point may be restated thus: Mill reduces the uniformity of the world to a network of particular uniformities of sequence between a group of antecedent phenomena and one consequent phenomenon. This is a correction of the common, crude view (in terms of which, however, Mill often speaks) that every consequent is the result of some one antecedent, each phenomenon being taken as though an obviously definite unit. But the parts of the world and their properties are more closely intertwined than we crudely suppose. So Mill corrects this view in two respects: First, he insists that in the cause we should enumerate all the conditioning antecedents; that is, all the antecedents whose combination is required that the effect may follow. All the conditions, positive and negative, are absorbed into the cause. Secondly, he insists upon the immediate succession of antecedents and consequent. There must be no intermediate steps between. The reason of this is that there may be unsuspected conditioning factors, and with the longer interval and the more opportunity we give unsuspected factors to operate the more likely it is that the expected sequence will not hold. A plot which is to culminate in a year is more liable to be frustrated than one which is to culminate in a day. Mill, it is true, does not correct the popular idea of effect as he does that of cause. He still selects some one consequent which he calls the effect, and thus gives room for the plurality of causes.[2] Theoretically this is an inconsistency. An effect is just as complex as a cause, and if we enumerated all its elements the plurality of causes would be impossible. Practically, of course, Mill is quite right; there would

[1] The supposition of "points" and "instants" is a mathematical refinement intended to provide a union of continuity and discreteness by bringing space and time into correspondence with the filled number system. But when we try to *apply* the formulae based on this supposition, the question of *what* points and instants to start with raises exactly Mill's "practical" problem over again, and cannot be met out of relation to a purpose which is dealing with the system of points and instants.

[2] See an acute discussion of plurality of causes in Hobhouse, *Theory of Knowledge*, 457–62.

usually be no gain in looking for all the elements in the effect. We are not usually so interested in the reasons of things as in how to bring about a particular result. But philosophically speaking, as Mill would say, we have a right to hold him to just as wide an extension of the effect as of the cause. Now when we try to make this view of causal sequence theoretically correct, how are we to decide which of the antecedents and consequents are relevant and which are not? A finite mind can never grasp all the antecedents. Unsuspected factors constantly enter, and may at any time prove important. Those which we commonly reject because too trivial or remote have an influence upon the effect which though at first perhaps infinitesimal may in time become vast. Theoretically, therefore, we should enumerate all the antecedents and consequents in the universe. Could we do this, we might say with confidence that were this cause ever repeated its effect would be repeated, and this without reference to the immediateness or remoteness of the cause and effect. This is the uniformity of sequence carried in one direction to its theoretic limit. Within this limit there must be uncertainty and imperfection in our grasp of causal laws. But this limit if theoretically perfect is obviously useless. Again, uniformity of sequence might be carried to theoretic perfection in another way. If the antecedents, as we have seen, are perfectly known, the certainty of the sequence will be absolute, no matter how great the interval between antecedents and consequents; there need be no time limit. The reverse is true, that if the antecedents are not completely known the probability of the sequence is less as the interval between the antecedents and consequents is greater. If, however, we bring them into relatively close proximity the probability of sequence becomes relatively great. The limit is reached when the time interval has become infinitesimal. We have then a mere tendency in the antecedents which awaits no interval in which it might be interfered with, and is therefore perfectly certain however small we make the group of antecedents, down to the infinitesimal limit. This result, again, is theoretically perfect but practically useless. Mill is locked up within the dilemma of a construction of causation which is either theoretically incorrect or practically of no avail.[1]

Indeed, this is an underestimate of the difficulty. We cannot call the limiting forms of the causal scheme even theoretically correct; they are entirely meaningless. It must be remembered that the problem of causation is to find uniform sequences, and it will be no solution simply

[1] Venn, *Empirical Logic*, 47–72, gives an excellent analysis of the antinomy of causation in Mill.

to eliminate the problem. If now the absolute certainty of a sequence is assured by screwing the antecedent and consequent so close together that no interval is left in which the sequence might be counteracted, the time relation has disappeared, and this destroys the sequence itself whose certainty it was sought to safeguard. If in the other direction the whole universe is included in cause and effect, the time limit spreads out to infinity, the history of the universe becomes a single event, and sequence is once more destroyed. Theoretically considered, then, Mill's view of nature as a set of given facts in causal relation breaks up into antinomies when pressed in either direction. We are compelled to return, as Mill did in his actual examples, from the philosophical to the practical view of causation. But to do so requires that we have a *criterion* of what shall be taken as a single fact, and such a criterion is not provided in the facts themselves in their mere given aspect. In causation practically considered such a criterion is provided; it is found in the personal relation of the inquirer to the situation. As this criterion is relative to the inquirer, Mill rejected it as practical, and the conception of causation in which it operates as unscientific. But the conception of causation which aims to be free from this defect collapses for lack of such a criterion. Once more it is seen that there is no place for inference in a world of pure fact.

This suggests the third difficulty, that proof, as proof, turns out to be merely a relation within given content, as was pointed out above. It is no longer a means of passing from one state of knowledge to another, such a function appearing irrelevant to its character as "given evidence" of a "given proposition," but it is now a relation within the content of a single state of knowledge. We have already seen how *any* inference, viewed *ex post facto*, must be as circular as the syllogism. This circularity centers in the very nature of mere proof, its evidential character lying as a fixed relation within its own content.[1]

How tautologous, for example, are Mill's proofs of causal laws. He takes his instances, already selected as relevant, orders them under the formulae of the methods, and points to them for the proof. It is *there*, in them, as they stand. The evidential relation lies within a content assumed to be already completely determined.

[1] "While the process of thought is still active, the logician . . . . has nothing to say to it; for his vulturine 'analysis' never ventures to attack a living thought. He appears upon the scene when the thinking is defunct and over. . . . . 'Logical analysis' first destroys the *real* connections between thoughts, and then *feigns* false ones" (Schiller, *Formal Logic*, 197–98).

Proof in this static sense resembles a map by which one may and often does represent the journey one has pursued. In the map, as in the proof, the actual movement or passage of the journey is lost, and that which was discovered in the course of the journey is represented simultaneously with the starting-point. Experience cannot be *reproduced* in a formula. It can be *represented*, but the adequacy of such representation is always relative to its purpose. Moreover, in the proof as on the map one may indicate a route that has never been actually followed. One may even amuse one's self by constructing endless maps and proofs without having journeyed or reasoned at all. And just as the route when projected on the map lets slip the real story of the journey, so proof fails to embody the actual process of inference, the account of which in the end must necessarily be given as a part of some one's personal biography.[1] The results of a scientific discovery are ordinarily our sole concern; having set them out in systematic relations with our other knowledge, we call this their evidence. But if we do undertake to give an account of how the discovery was made, we are drawn back to its setting in the life-story of the scientist. Our systematized "proof" of the discovery does not reproduce either the problem or the solution as these originally appeared to the discoverer. Inference as discovery will be further considered below.

It may be worth while to illustrate this point in a different field. Consider the case of a debater, whose mind is definitely made up on the main question, but searching for arguments with which to convince his hearers. This man certainly has a problem before his mind, but it is not the problem expressed by the question in debate. It is the problem of selection of materials that shall stand in certain relations to other materials. This relation may, if you please, be called evidential. It is intended to operate in an inferential process in the hearer's mind. But to the debater's own mind[2] that so-called evidential relation does not operate inferentially, and the selection of evidential materials is no more inference for him, as regards the question in debate, than would be the selection of rhyming words or the parts of a puzzle picture. Proof, then, may mean two different things. It may mean either the reconstruction of content by which an actual inquiry is met, or a relation within the

[1] In the last analysis is not the historical more fundamental than the scientific point of view? This is perhaps the ultimate issue between instrumentalism and intellectualism.

[2] And to the hearer's mind when the debate is over and he reviews the argument as a whole.

content as it is looked back on by the inquirer after the reconstruction, or as it is supposed to apply to the problem of some other inquirer. Under the first alternative proof is evidentially operative in an actual inference; under the second alternative it is not. The latter is "formal" proof.

Proof in the latter sense may reach any degree of detachment from actual inference. The content, and the so-called inferential relations within it, may become indefinitely abstract and schematic. Such is the case, for example, in the field of mathematics and of mathematical logic. The inquirer indeed does form a succession of inferences *about* the content as he is building it up, but the relations of "implication" exhibited *in* the content after it is built up are not inferences at all in the same sense; or perhaps in any proper sense.[1]

As the difficulty presents itself in Mill, it seems that the facts must already have been determined before proof appears, and the proof is of the nature of an *ex post facto* reading of the facts after the real inference has been made. This view of proof leaves untouched the question of how the facts were determined. This question receives partial consideration under Mill's treatment of hypothesis, to which we now turn.

[1] In criticizing this sentence of Adamson, "No logical method can be developed save from a most definite conception of the essential nature and *modus operandi* of thinking," Professor Marvin says, "To which the reply can *in the present day* be given: 'But it has been done, such a symbolic logic actually obtains'" (*Journal of Phil.*, etc., May 8, 1913, p. 275). Even in the present day the claim of symbolic logic to be independent of the nature and method of thinking might be challenged. Its whole scheme of implicational relations is only one stage in the development of an instrument for the *use* of actual *thinking*.

CHAPTER VI

INFERENCE AS DISCOVERY

In his formulation of the inductive methods, Mill set out to describe the process by which general propositions are established. As the inductive methods are merely means of elimination among alternative propositions, the outcome is to reduce inference to disproof. But Mill cannot permanently lay aside as merely psychological the question of how we get the alternative propositions upon which disproof is to operate. He is forced to acknowledge a place in inference for the formation of hypotheses. Inference as discovery inevitably involves a hypothetical approach to the conclusion; and this may fairly be called Mill's third conception of inference. In answer to the question where we get the propositions to be established, we must say that they come as hypotheses.

The official place of hypothesis in Mill's doctrine of inference is twofold.[1] First, it appears as a means of extending the "method of deduction," by substituting a supposed proposition where no suitable one is known, and testing it by the consequences drawn from it.[2] Secondly, it appears in several of the processes subsidiary to induction, processes that have to be performed before induction is ready to operate. At neither point is the process of forming hypotheses given a central, constitutive part in inference. Mill can still speak of "perfect induction without any mixture of hypothesis,"[3] or of a "theory" that has in it "nothing, strictly speaking, hypothetical."[4]

At one point or another of his discussion, indeed, Mill is obliged to acknowledge a hypothetical factor at every step of inference. These admissions appear mainly in the sections that deal with "subsidiary" operations, and the most significant of them appear in passages added, under stress of controversy, in the later editions of his work. They do not lead Mill to reconstruct the non-hypothetical character of his view of inference and its relation to fact. But they do allow a tentative factor through the whole process of inference *as it is in operation*. Consider, for example, his treatment of analogy.[5] Analogy is recognized as hypothetical; but all inference is analogical in so far as it is a taking of

[1] On Mill's doctrine of hypothesis see Dewey, *Studies in Logical Theory*, 160–68.

[2] 350*b*, *c*.

[3] 359*b*.

[4] 360*b*.

[5] Book III, chap. xx.

one situation to be like another. Again, abstraction or "the formation of concepts"[1] is but another name of hypothesis. Mill shows with admirable clearness that the mere naming of a fact implies that one has already interpreted it in terms of other experiences, though apparently he had not thought of this when he based inductive proof on "cases." "We cannot describe a fact without implying more than the fact." "An observation cannot be spoken of in language at all without declaring more than that one observation; without assimilating it to other phenomena already observed and classified."[2] Mill gives some striking descriptions of the method by which one meets actual problems, as in "the search for a lost object,"[3] or the unraveling of "the true history of any occurrence from the involved statements of one or of many witnesses." "He extemporizes, from a few of the particulars, a first rude theory of the mode in which the facts took place, and then looks at the other statements one by one, to try whether they can be reconciled with that provisional theory, or what alterations or additions it requires to make it square with them. In this way . . . . we arrive, by means of hypotheses, at conclusions not hypothetical."[4]

Of special interest are Mill's admissions that any experiment—and the inductive methods are all essentially formulae of experimentation—receives its very point from the hypothesis it is to test. "All experimental inquiry assumes provisionally some theory or hypothesis, which is to be finally held true or not, according as the experiments decide." "The theory itself preceded the proof of its truth. . . . . It had to be conceived before it could be proved. . . . . All the true theories in the sciences . . . . began by being assumed."[5] "Nearly everything which is now theory was once hypothesis. Even in purely experimental science some inducement is necessary for trying one experiment rather than another."[6] This conflicts with the statement assigning the place of hypotheses in Mill's original scheme, that they "are invented to enable the Deductive Method to be applied earlier to phenomena";[7] for it is only on the prompting of hypotheses that the deductive or any other method is ever applied at all. Without hypothesis Mill's own methods would be open to the strictures he brings against Bacon's step-by-step method.[8] His attempt to work out a set of inductive methods as self-contained and non-tentative in their "proof" as the syllogism had seemed to be has broken down.

[1] Book IV, chap. ii. [2] 452*a*, *b*. [3] 463*e*.

[4] 354. The final words, "conclusions not hypothetical," could be accepted only subject to the interpretation given below, that they differ only in degree and function.

[5] 184*b*–85*a*. [6] 353*c*. [7] 350*b*. [8] 603*c*–04*b* and note.

But however wide a scope Mill is finally compelled to grant to the operation of hypothesis, he does not adequately appreciate the organic interrelation of hypothesis and fact. Indeed, he allows hypothesis *too much* scope. "An hypothesis being a mere supposition, there are no other limits to hypothesis than those of the human imagination; we may, if we please, imagine, by way of accounting for an effect, some cause of a kind utterly unknown, and acting according to a law altogether fictitious."[1] This extreme statement, it is true, receives some limitation later on; but without sufficiently clear recognition of the principle that *every genuine hypothesis makes a tentative claim to be fact.* Mere play of the imagination may have aesthetic or other values; but only as a hypothesis is a genuine and controlled effort to grasp the facts, and because it is that, does it hold any place as a tentative inference. There is an organic interrelation between hypothesis and fact. In actual inference the two are not held over against each other. Hypotheses are simply our best grasp of the facts—tentative, but genuinely objective—at any one stage of the proceeding. Facts are hypotheses that no longer require a tentative attitude, but have obtained acceptance. Between the two there is progressive interaction, and this interaction constitutes inference.

Hypotheses, according to Mill, are of two kinds,[2] in one of which the existence of the cause is acknowledged but its law of operation is supposed; in the other the law is acknowledged and the cause supposed. Of this second kind there are again two varieties: the hypothetical cause may be a supposed collocation of agents of a known kind[3] or a supposed agent of an unknown kind. The last variety, however, must either be the supposition of a law, in the form of certain properties of the agent, and so fall under the first head, or it collapses into a merely verbal form, without even a tentative claim to be a fact.[4] The other two correspond to the two great types of problem, in which either the major or the minor premise is in question; for the difficulty in a situation that needs clearing up may lie primarily in the need either of constructing or of selecting a concept, the concept standing for the mode of interpretation which we carry over from one experience to another. While Mill's classification of hypotheses and his selection of examples are somewhat confused in detail, it is at least clear that hypothesis has its place in the clearing up of any problematic situation; it is not limited to the discovery of universal propositions only.

[1] 349*d*. Cf. Hobhouse, *Theory of Knowledge*, 418.

[2] 349*d*. [3] 359*b*–60.

[4] 355*a*–59*a*. Cf. 351*d*–53*b*.

However broad their service in leading over from some facts to others, in their inner character they seem for Mill to be made of a different sort of stuff from the facts which they are intended to explain or by which they are tested. But is not this to misunderstand the character of these facts? On the one hand, if we *had* the facts at the start there would be no occasion for any hypothesis and none would arise. It is because in some respect the "facts" have failed us that we are compelled to attempt a reconstruction, and our reconstruction at any stage *is* the nearest available approach to the facts. If not fact, the hypothesis is the most active possible candidate for that title. When a hypothesis becomes fact, it does not change its inner nature; it simply does its work so well that it satisfies.[1] It is idle, therefore, to treat the facts as already given, and the hypothesis as a structure of our own somehow additional to the facts; for we get hold of the facts only as some interpretation of them obtains justification by satisfactorily clearing them up. The interpretation provides the facts quite as truly as the facts suggest the interpretation; because the facts for us are always the facts as we interpret them, and our interpretation is always the best statement we can offer, under the circumstances, of what the facts really are. So, on the other hand, the proof of a hypothesis is not the external and accidental bringing of it to the test of facts which are alien to its nature and which would remain untouched by its own fate. Mill employs no little ingenuity in explaining why a legitimate hypothesis must be capable of proof by "independent evidence." Is it not simply that if the hypothesis has done its work the facts to which it brings us *must* be different from the "facts" from which it set out, else these would never have needed the reinterpretation?

Mill distinguishes hypotheses which can be proved from those which can only be disproved. "We want to be assured that the law we have hypothetically assumed is a true one; and its leading deductively to true results will afford this assurance, provided the case be such that a false law cannot lead to a true result; provided no law, except the very one which we have assumed, can lead deductively to the same conclusions which that leads to. And this proviso is often realized."[2] But it is realized only inside of a larger system which for the purpose of the inquiry need not be questioned, but is of the same essential character as that of the interpretation within the system. Alternatives which at one stage of an investigation or one period of human knowledge seem to

[1] Sidgwick, *The Process of Argument*, 12–21, makes an acute analysis of the relation of fact and inference, and shows it to be one of degree.

[2] 350*d*.

be absolute mutual exclusives, cease later to be such through a revision of the system within which they fall. In contrast to the hypothesis that can be definitely proved, Mill considers such hypotheses as that of Descartes' celestial vortices, which "could not lead to any course of investigation capable of converting it from an hypothesis into a proved fact. It might chance to be *dis*proved. . . . . Direct evidence of its truth there could not be."[1] In principle, however, there is no difference; all proof is disproof. There is every difference in the degree to which the disproof of one interpretation is felt to be a satisfactory proof of another, but there is never another *kind* of proof than that. The movement of inference is positive, not negative; and any bona fide interpretation of the facts has a right to hold the field till it meets with obstacles and is challenged by a better.

There seems to be no escape for Mill from an *ex post facto* view of "facts." After an inference has done its work we can *then* look back upon the facts as the inference has now interpreted them, and our rejected or outworn hypotheses we set up in contrast to the facts and call them errors. This *ex post facto* attitude is the temptation always waiting in the path of the realist, as Mill must be classed in this part of his theory. The very word "fact" plays into his hands.[2] For common purposes we very properly confine attention to the results of our inferences, and forget the process of the inference, as we might kick out a ladder when we have climbed to our goal. We then speak of the facts at an earlier stage as we now at a later stage know them to have been, which is legitimate from the point of view of the later stage, but illegitimate if we shift the point of view to a consideration of the inference as it took place at the earlier stage. Mill exemplifies this shift when, in connection with the passage just quoted, he says of the vortices of Descartes, that "the hypothesis would have been false, though no such direct evidence of its falsity had been procurable."[3] Here the shift of standpoint is surely obvious. But precisely the same shift, though in more subtle guise, is involved in the assumption that definite, accepted facts are at hand both to prompt and to test hypotheses.[4]

[1] 355*a*.

[2] "It is impossible to bring one's beliefs into harmony with facts, except so far as the facts are known to us" (Joseph, *Introduction to Logic*, 344).

[3] 355*a*.

[4] Mill commits the same fallacy when he seriously maintains that if one asserts a general proposition he has thereby actually asserted every case, including those then unknown, that may ever come under it (141*a* and note). This is to occupy an assumed point of view, not merely of the "innocent bystander," but of an *absolute* bystander.

This would seem to afford an explanation also of Mill's repeated controversy with Whewell regarding the difference between colligation of facts and induction. It is an *ex post facto* distinction. An induction, Mill holds, must be either true or false, while a mere colligation need not be either.[1] But many an alleged induction has proved later to have been a colligation in Mill's sense. Mill admits that the colligation is "not the sum of the observations *merely*," but is "the sum of the observations *seen under a new point of view*"; but claims that "a real induction is . . . . the sum of *more* than the observations."[2] But this is to forget that a new point of view *is* more, in the sense of a reconstruction, a better grasp of the facts, and that a real induction adds a general law to the facts *only* in the sense of *knowing them better*. The general law has no existence whatever outside the facts, if we remember that the only facts we can speak of are the facts as we take them. But as we look back upon our inferences we distinguish the constructions made from a discarded "point of view" and those which still hold good; the one we then may very well consider a colligation of the facts under a descriptive conception, the other we consider the addition of real law.

It is possible in the same way to explain Mill's contention regarding the origin of our "conceptions," which is simply the question of whence our hypotheses arise. Mill, in defense of empiricism, set out boldly with the assertion that "the conceptions . . . . which we employ for the colligation and methodization of facts, do not develop themselves from within, but are impressed upon the mind from without," and that they are usually obtained by comparison and abstraction "from the very phenomena which it is their office to colligate."[3] Mill is quite right here as against the extreme a priori position of Whewell. But the conception we use is after all a function of our previous experience and of the whole situation, the hypothesis being tentatively taken and the situation gradually cleared up. Mill goes on, in very different terms from those just quoted, to describe the process by which "we advance from a less to a more appropriate general conception, in the progress of our investigations";[4] the process in which the conception is alternately "furnished *to* the mind" and "furnished *by* the mind." "In endeavoring to arrange the facts, at whatever point we begin, we never advance three steps without forming a general conception, more or less distinct and precise; and . . . . this general conception becomes the clue which we instantly endeavor to trace through the rest of the facts." "If we are not satisfied with the agreements which we discover among the phenomena" by

[1] 218–19. [2] 221*d*. [3] 457*c*. [4] 463*c*.

using this conception, "we change our path, and look out for other agreements." "The different conceptions which the mind successively tries, it either already possessed from its previous experience, or they were supplied to it in the first stage of the corresponding act of comparison."[1] This tentative process can be defined only in terms of the mutually constitutive relation of hypotheses and facts.

Still less can Mill maintain that the contribution between hypothesis and fact is all in one direction when he explains what is meant by "appropriate" conceptions. "The question of appropriateness is relative to the particular object we have in view."[2] "Some modes of classing things are more valuable than others for human uses, whether of speculation or of practise; and our classifications are not well made, unless the things which they bring together . . . . agree with each other and differ from other things in the very circumstances which are of primary importance for the purpose . . . . which we have in view, and which constitutes the problem before us." Our conceptions must "help us toward what we wish to understand."[3] But, now, what is the *criterion of such appropriateness?* The answer is suggested by Mill, though he by no means appreciates its full significance. "That the conception we have obtained is the one we want, can only be known when we have done the work for the sake of which we wanted it; when we completely understand . . . . the phenomena . . . . with which we concern ourselves." But "premature conceptions we must be continually making up, in our progress to something better. They are an impediment to the progress of knowledge, only when permanently acquiesced in."[4] The "work to be done" by the hypothesis is to give us the very facts which we can then, if there is occasion so to do, assume to have been present before the hypothesis was suggested. We are entirely justified in reading them back in this way from the later point of view after we have reached it, and so long as we maintain it; but we could not have held this point of view, or grasped the facts which we thus read back, if the hypothesis had not done its work.

The cardinal error, then, of Mill's theory of inference is to read back the results of inference so as to make it seem to operate upon completely determined fact. The facts on which inference is supposed to be based, and to which it is expected to apply, whether these are regarded as the ultimate mental constituents of associational psychology or the things and events of objective naturalism, are by Mill all equally taken to be the sort of definitely determined realities such as they can be known to

[1] 459*b*. [2] 459*d*. [3] 462*e*–63*a*. [4] 463*b*.

be only after inference has in any case done its work. Facts when thus determined are found to possess attributes whose universal and systematic character betrays their origin in the reflectively interpretative constructions of experience. In passing from one fact of this kind to another there is no place found for a living act of inference, because the work which inference should do has already been assumed, and inference collapses into a formal relation within simultaneously presented contents. While a subsidiary place must finally be left open for invention and discovery, these are not assigned by Mill any constitutive function in the determining of the facts which were given in the first place. Fact and inference therefore fall apart, and in trying to find a vital relation between them Mill oscillates from one to the other. His difficulties could be removed only by recognizing the ultimate unity of inference and fact, and developing their distinction only as an instrumental function in the process of knowledge.